DWITE '11 R2 #4 - Bear Trees

Time limit: 1.0s **Memory limit:** 64M

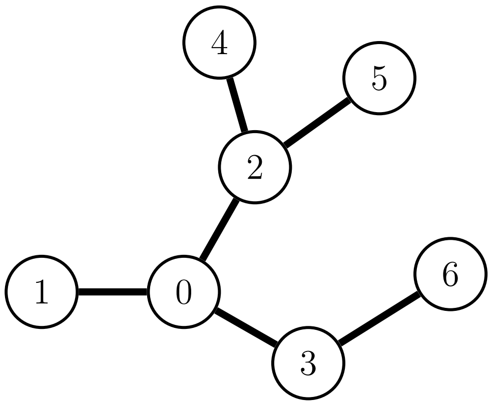
DWITE, November 2011, Problem 4

Gary is a bear. He lives in a system of caves, consisting of N caverns, numbered from 0 through $N-1$. These caverns are connected by bidirectional tunnels, such that there is exactly one path between each pair of tunnels. (You might also know this kind of structure as a "*tree*", so you'll know that there are exactly $N-1$ tunnels.)

Gary would like to explore this system of caves, using the following method:

- Put cavern 0 (his home) on a "to explore" list.
- Choose one cavern C from the list.
- Remove C from the list.
- Explore C: Add all caverns adjacent to C that have never been on the list.
- Repeat steps 2 to 4 while the list contains at least one cavern.

There are many ways to explore a system of caves. However, bears are forgetful. You would like to find a way to explore the cave such that **the maximum length of the list is minimized**. For example, given the following tree:



Here is one possible way to explore the tree, where the maximum length of the list is 4:

- Explore 0, list = $\{1, 2, 3\}$
- Explore 2, list = $\{1, 3, 4, 5\}$
- Explore 1, list = $\{3, 4, 5\}$
- Explore 3, list = $\{4, 5, 6\}$
- Explore 4, list = $\{5, 6\}$
- Explore 6, list = $\{5\}$
- Explore 5, list = $\{\}$

However, exploring in a different order, Gary can make it such that he never has to remember more than 3 elements; indeed, it is easy to see that 3 is optimal. Gary has retained you to find this minimum list length, given a system of caves.

Input Specification

The input will contain 5 test cases. Each test case will begin with one line, containing the number of caverns $1 \le N \le 1\,000$. $N-1$ lines will follow, each consisting of two distinct space-separated integers x and y, denoting a tunnel between caverns x and y. Of course, no tunnel will be described more than once, and $0 \leq x, y < N$.

Output Specification

The output will contain 5 lines of output, the minimum list length for each cave system.

Sample Input

```
7
0 1
0 2
0 3
2 4
2 5
3 6
4
0 1
1 2
2 3
```

Sample Output

```
3
1
```

Problem Resource: DWITE